RDT FACTORY SYSTEM TEST PLAN

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1. INTRODUCTION

This plan has been prepared by Systems Consultants, Inc. to document the design of and procedures for conducting the Factory System Test of the Remote Data Terminal (RDT) system. It is intended to fulfill the requirements of paragraphs 4.2.7 and 4.3.7 of the contract Statement of Work. A secondary purpose of this test plan is to facilitate the design of the Acceptance Test (paragraph 4.4.3 of the Statement of Work) by highlighting RDT system requirements which cannot be verified during the Factory System Test for technical reasons, and by providing a baseline design for the test.

The RDT is intended to be used in a full duplex mode with bit rates as high as 9600 bps, and therefore any meaningful system test must include or simulate this environment. However, a test which includes only the 9600 bps, full duplex environment would be inherently disorderly and would lack discrimination (i.e., the ability to detect and properly characterize faults). Consequently, the Factory System Test design includes half duplex operation tests (at 9600 bps) as preludes to the full duplex testing. If during the course of testing it becomes apparent that operation at 9600 bps is not possible, successively lower data rates will be tested until a data rate is reached at which queue stability is attained.

The tests described in the following sections are functionally oriented: they are designed to verify the functional requirements of the contract specification and are executed in a sequence representing normal operations where possible.

The RDT cannot be tested with efficacy unless it is on-line. Consequently, most of the testing will be conducted in a simulated RDT-HDS on-line environment. This will be accomplished by using the backup system as an HDS emulator, and connecting the RDT to the HDS emulator using a MODEM Eliminator. As will be explained below, the distinction between the RDT and the HDS emulator will be artificial for the purposes of the Factory System Test, because some of the test events will be accomplished in parallel.

Section 2 describes the tests associated with RDT startup and some functions which can be performed off-line. For these tests, the system will be configured in its deliverable form. After completion of these tests, the hardware will be reconfigured as described in the foregoing paragraph.

Section 3 includes tests of the procedures and system functions related to establishing RDT on-line status.

Having demonstrated the adequacy of the on-line to backup system interface, and that the system can be brought on-line with the HDS emulator, tests of the message transmit and receive functions will be performed. Procedures for these tests are delineated in sections 4 and 5. In the interest of efficiency, it is intended that these half duplex tests be conducted in parallel: If the two RDT systems are designated "A" and "B", then system A will act as the RDT and system B the Host emulator for the Originating Message Traffic Processing tests, while simultaneously System A will act as the HDS emulator and system B the RDT for the Terminating Message Traffic Processing tests.

Section 6 describes the full duplex tests. In effect, the full duplex test is identical to the Originating Message Traffic Processing tests except that both systems A and B will originate (and hence receive) messages.

This report includes two appendices which were prepared during the course of Factory System Test design. The first and second appendices list all the RDT commands and alarms, with references to the particular test segments where they are tested. The third appendix lists all RDT operator alerts, with references to the principal tests which include them. Alerts are distinguished from alarms in that the former do not result in SCC log entries, while the latter do if they appear on the SCC console. The appendices were included in the test plan to facilitate review of the document for adequacy and to aid in designing the Acceptance Test.

Except as noted, all of the tests will be performed using the system operational procedures contained in the RDT Operators Manual. The major exceptions are those test elements in which a malfunction or misapplication is deliberately introduced so as to verify appropriate RDT response.

Verification of proper system performance during the test is to be accomplished by observing information displayed in real time, examining hard copies of messages, or examining hard copies of logs. In most instances (and as indicated in the text) the first of these methods is to be used. As examination of the logs is essential to verification, it is required that complete sets of logs be printed on an hourly basis throughout the test.

2. SYSTEM START UP TEST

The purpose of this test is to verify that: The system can be brought up (cold start or warm start); that the peripherals can be brought up or shut down under operator control; and that device status is portrayed to the operator.

A. COLD START (demonstrate adequacy of procedures/software)

B. WARM START (demonstrate adequacy of procedures/software). This test will include the TTY and TM commands.

C. "UP" devices (demonstrate response to operator commands for each device.

1. Discs, Terminals, Printers, ...

2. Copy Disc

a. With both discs in an operable status, issue COP command. The DISC COPY IN PROGRESS alarm should appear immediately, followed by the DISC COPY AND VERIFICATION COMPLETED alarm when the copy process has been successfully completed.

b. Repeat the above, but abort the copy after it has begun. The DISC COPY AND VERIFICATION ABORTED alarm should appear.

c. Attempt to accomplish a disc copy with the backup disc inoperable. The DISC DS1 INOPERABLE alarm should result.

D. "DOWN" devices (demonstrate system response to operator commands for each device).

1. After downing each device (DWN command), issue a command involving that device (e.g., PNT for the line printers). The DEVICE NOT AVAILABLE Alert should result.

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E. Status

1. Provide status report in response to the STA command

   a. Print status report using the PNT,n,RP command. Verify that displayed and printed reports are identical in content and format.

2. Issue ALARM if any device malfunctions (will simulate malfunction for each peripheral device by "downing" it locally).

3. Test the SCC CONSOLE DOWN Alert by removing the console from the system (i.e. downing it locally). The Alert should appear on the Operator consoles.

F. Verify that the UP; DWN; STA; TM; TIM; and COP commands can only be entered thru SCC Console.

NOTE: The Warm Start test will have to be repeated with messages in process to verify that the system saves appropriate files in the event of a catastrophic failure. This will be accomplished during the Full Duplex testing (Sec. 6).

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3. SIGN ON TEST

A. Verify the sign-on Process

1. Normal condition: RDT sends sign on message in response to SON command, and upon completion of the sequence the SIGNED ON alarm appears.

2. Reject sign-on command if signed on

3. Test with no HDS response: Should get UNABLE SIGN ON alarm (after automatic retransmission of the sign on sequence).

4. Verify that the SON command can only be entered thru SCC Console.

B. Verify the Enquiry Sequence. After signing on, disconnect the receive line from the MODEM eliminator. Four and one half minutes later, the NO ENQ RESPONSE alarm should appear.

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4. ORIGINATING MESSAGE TRAFFIC PROCESSING

The purpose of these tests is to verify that the RDT performs all specified functions having to do with generating and transmitting a message in an environment where messages are not being received.

To perform the tests involving queuing the Teletype and DATA circuits should initially be in an inactive state (OUT and ORD) so as to initialize transmission with queues in existence.

A. Send Service Messages. To perform the test for each wire, the operator will enter the appropriate command, and will verify that the appropriate service wire is transmitted, and that the format and contents of the displayed information are correct. Transmission will be verified by checking the contents of the RDT output log and the HDS emulator input log. Prior to transmission of the first message, the CIN command must be issued from the SCC console. Verify that the command is rejected if entered from another console, or if the TTY circuit is already in operation. Format verification will be performed at the HDS emulator by examining the message displayed on the SCC CRT.

1. Demonstrate ability to retrieve and transmit the QRT, QRV, ZES, ZFX and CSR messages from the SCC console. (Attempt to send from other consoles will result in rejection of the command.)

2. SVC Message

   a. Demonstrate ability to retrieve partially completed service message from any console using SVC command

   b. Demonstrate ability to edit from any console using following commands: U,ln; D,ln; S; I; R; C,abc.../xyz...; L;X

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3. CCK Message

a. Normal Sequence: Transmit CCK message from SCC console (verify that CCK command is rejected if entered from operator console) of the RDT. Upon receipt of CCK, the HDS emulator sends any TTY block. Wait 20 minutes. No alarm should appear.

b. Abnormal Sequence: Transmit CCK message from RDT as before. HDS Emulator does not respond. Fifteen minutes later, the NO COMP-TTY CCK alarm should appear.

B. Send TTY Message

1. Demonstrate Message Generation: Verify ITM validity from SCC and OPER consoles. This test is to be repeated a minimum of three times, once for each of the following combinations of header and text source devices: Paper Tape Reader-Paper Tape Reader (PTR-PTR), TTY-TTY, CRT-PTR, CRT-TTY, and CRT-CRT. The ITM,hdr-dev,txt-dev command should be rejected if the header and text devices are not the above combinations. Since the ITM command is valid for all consoles, at least one valid ITM command entry will be made from an operator console. During the operator review process, exercise the N command and verify that its invocation causes the next 20 message lines to appear on the originating CRT. While generating a message on a CRT, ensure that a line consisting of more than 72 characters cannot be entered.

2. Demonstrate Validation & Transmission (SCC and OPER Console.)

a. Upon release, the valid message enters the queue, has a TSN assigned, is logged in, has a TI assigned, is transmitted and logged out. (No circuit problems.)

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b. Invalid Message

(1) Attempt to send message containing all of the following FMT LINE errors. Errors should be detected sequentially and the message queued for spill back to the originator's console for correction.

(a) Format Line 1 Errors

i) 1 - SOM incorrect

ii) 2 - Channel designator portion of TI not alpha

iii) 3 - Channel sequence number space filled

Routing (b) Format Line 2: 1-Precedence Line Incorrect

(c) Format Line 3:

i) 1 - Routing line incorrect

ii) 2 - OSRI Missing or contains non-alpha character

iii) 3 - OSRI Character count

iv) 4 - # does not precede HSSN

v) 5 - HSSN missing or contains non-numerics

vi) 6 - HSSN length greater than 4 digits

blank vii) 7 - JDTG not preceeded by blank

(d) Format Line 4: 1 - Security Protect line missing or incorrect

(e) Format Line 12E

i) 1 - Keyword sequence has no dash

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(f) Format Line 15

i) 1 - TSSN Line missing or incorrect

ii) 2 - TSSN contains non-numerics

iii) 3 - TSSN value does not agree with HSSN of Format line 3

(g) Format Line 16

i) 1 - EOT not present

c. Queuing I

(1) Demonstrate that valid message enters transmission queue in precedence order. This is to be accomplished in the following manner: Two or more messages of differing precedence are generated and then released in reverse precedence order. Examination of the logs should show that the message TSNs are in the order in which they were released and that the TIs are in precedence order (higher precedence message has lower value of TI).

d. Logging and Courtesy Copy Printing

(1) Demonstrate that input and output log entries are created, include all required contents, and are in the proper format. This is to be accomplished by examination of the input and output logs.

(2) Demonstrate that a courtesy copy is printed after completion of validation.

(3) Verify that the message logs can contain approximately five days' entries.

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(4) Demonstrate that where overwriting is required, it is accomplished by overwriting the oldest log entry.

(5) Demonstrate the ability to retrieve the message logs or any portion (as appropriate to the command) using the following commands, entered from any console: PNT,n,ML; PNT,n,ML,tsn; PNT,n,ML,ti; PNT,n,ML,jdtg; PNT,n,ML,jdtg,jdtg.

(6) Attempt to retrieve the message log entries for fictious messages by executing the above commands using nonexistent TI, TSN or JDTG. An alarm should result.

e. Transmission I

(1) Test normal message transmission procedures by executing the TMM command. Transmission of the message is verified by observing the output log. Repeat the test using a message containing validation errors and the TMM,NV command.

(2) With messages in the transmission queue, repeat the above test (TMM command) then issue the OFF command. Repeat again using the OUT command, and again using the ORQ command.

(a) In the case of the OFF command, the transmission should be terminated with a CANTRAN sequence and no further transmission should be possible until the SON command is issued, and the TTY circuit enabled using the CIN command.

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(b) With the OUT command, the TTY transmission in progress should be completed but further TTY transmission should be disabled until issuance of the CIN command. Verify by examining the logs.

(c) Issuance of the ORQ command should result in termination of the transmission in progress with a CANTRAN sequence with further TTY transmissions inhibited until issuance of the CIN command. Verify by examining the RDT logs.

In all of the above cases, the message in transmission should be requeued. This can be verified by re-activating the TTY circuit, then examining the RDT output log to verify transmission.

(3) Verify the HUNG BLOCK alarm by resetting the HDS up bit at the HDS emulator. This will cause the HDS emulator to not acknowledge (ACK) the message blocks. Then send a TTY message from RDT. The alarm should appear.

(4) Verify that message transmission is in precedence order. This will be accomplished by disabling the TTY circuit and releasing a series of messages for transmission, and then allowing sufficient time for all messages to clear validation and queue for transmission. The circuit will then be enabled (CIN command) and a FLASH message released. Comparison of

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logs should show that the FLASH message completed transmission before all other messages in the queue except for the message in transmission when the FLASH message entered the queue. The FIFO requirement for messages of equal precedence will be tested at the same time by releasing a second FLASH message shortly after the first. The output log should show the FLASH messages to have been transmitted in the order of their release.

f. Demonstrate the capability to purge a message. This will be accomplished using the PUR,TM,tsn command. The RDT should respond with the TSN xxx - MSG PURGED alarm. Apply the PUR command to a message which is queued for transmission, then examine the message logs after the queue has been cleared to verify that the message was not transmitted.

g. Demonstrate Retrieval and Retransmission capability. This test is essentially an exercise of the GET command. The test will be repeated a total of five times, verifying the capability of RDT to retrieve a TTY message from disc by either its TSN or TI, demonstrating that GET can be executed from any system console, and showing that an attempt to retrieve a purged message results in the MESSAGE NOT FOUND alert. The test will also include exercising the RTT command, with examination of the RDT message logs to verify the following:

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(1) There is no new TSN assignment for a retransmitted TTY message.

(2) The logs are properly annotated, indicating a message retransmission.

(3) A message which is retrieved but not retransmitted is not logged.

Demonstration of the actual retransmission is to be accomplished by exercising the RTT command, calling the message by TI or TSN and will be verified by examining the message logs. As this command is valid only at the SCC console, the test will include an attempt to use it from an operator console. The result of such an action should be rejection of the command.

3. Demonstrate capability to print TTY messages from all consoles using the PNT and PCH commands.

a. Check ability to print 1-9 copies

(1) Print by TSN on Line printer (PNT,n,TM,tsn command) or TTY (PCH,TTY,TM,tsn command)

(2) Print by TI on line printer (PNT,n,TM,ti command) or TTY (PCH,TTY,TM,ti command)

b. Demonstrate ability to abort the printing of a message (BOR,dev command). This will be accomplished by issuing the PNT,n,TM,ti or tsn or PCH,TTY,TM,ti or tsn command, then the appropriate BOR,dev command. The second command should result in immediate cessation of printing. Repeat the test to demonstrate the validity of the BOR,dev command from any RDT console.

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c. Verify the (Device) BUSY alarm. This is to be accomplished by entering the PNT,n,TM, ti or tsn, or PCH,TTY,TM,ti or tsn command for a message. Once printing has begun, the command is to be repeated. The alarm should be issued.

d. Verify the RDT DEVICE DOWN-(dev) alarm. The procedure is: first down the line printer or TTY using the DWN command. Next, issue the PNT,n,TM or PCH,TTY,TM command (respectively). The alarm should result.

4. Verify SCC Logging functions

a. Entry

(1) Verify capability to make an SCC log entry using The CMT,x_1,...., x_{65} command

(2) Verify that all RDT commands and alarms appearing on SCC console result in log entries

(3) Verify that the SCC log contains the correct information in the proper format by examining its contents.

b. Retrieval

(1) Verify automatic printout of SCC log when a page is filled.

(2) Verify ability to retrieve entire logs or any portion (as appropriate to the command) using the following commands from both the SCC and OPER consoles: PNT,n,SL; PNT,n,SL,jdtg; PNT,n,SL,jdtg,jdtg

(3) Verify the SCC LOG (JDTG) NOT IN FILE alarm by attempting to retrieve a non-existent SCC Log entry.

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To accomplish this, execute the PNT,n,SL,jdtg command with a fictitious Julian date time group parameter.

c. Formats: Verify that the message and SCC log formats are as required, and that the displayed and printed formats are identical.

C. Send Data Message (repeat tests as required for each block size)

1. Demonstrate Message Generation:

Verify IDL validity from SCC and OPER consoles. The IDL command allows the DATA message header to originate either at the operator CRT or the card reader, and the text to originate from the CRT, Mag tape unit or card reader independent of the header device. Thus a complete test of this command involves 12 possible combinations of consoles, header sources and text sources, as indicated in Table I. For the Factory System Test, each of the combinations listed below will be tested unless the requirement to do so is specifically waived by the Sponsor. In that event, and possibly for the purposes of Acceptance testing, a smaller sample of combinations might be suitable. So that random selection of the combinations can be accomplished, it is suggestedzthat a coin be tossed and a die cast, and the result matched with the table to select a combination for IDL. Multiple test events can be selected by repeating this procedure, discarding like outcomes. During the course of this test, the BLOCK SIZE ERROR alarm will be tested by specifying the wrong input device block size parameter in the IDL, hdr-dev,text-dev,blksiz command. In addition, the FILE COUNT

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ERROR and RECORD COUNT ERROR alarms will be tested by deliberately entering incorrect information when generating a DATA message header. The incorrect information shall consist of counts which are larger than those of the actual text.

Selection Aid		Console	Header Device	Text Device	Transmitted Text Block Size, Coding
COIN	DIE				
H	1	SCC	CRT	CRT	80, EBCDIC
H	2	SCC	CRT	MT	80, BINARY
H	3	SCC	CRT	CR	80, EBCDIC
H	4	SCC	CR	CRT	80, EBCDIC
H	5	SCC	CR	MT	120, BINARY
H	6	SCC	CR	CR	120, BINARY
T	1	OPER	CRT	CRT	80, EBCDIC
T	2	OPER	CRT	MT	132, BINARY
T	3	OPER	CRT	CR	120, EBCDIC
T	4	OPER	CR	CRT	80, EBCDIC
T	5	OPER	CR	MT	120, BINARY
T	6	OPER	CR	CR	132, BINARY

TABLE I

2. Demonstrate Validation & Transmission from all consoles using the TMM command. Before a message is transmitted, the DATA circuit is to be brought up using the CID command.

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a. Valid message enters queue, has TSN assigned, is logged in, reported in transmission, is transmitted, logged out and has transmission reported complete (no circuit problems).

b. Invalid Messages

1. FORMAT LINE ERRORS. Attempt to send message containing all of the following FMT LINE errors. Errors should be detected sequentially and the message queued for spill back to originator's console for correction.

(a) Format Line 1

i) 1 - Block length

ii) 2 - Text code

iii) 3 - Print control flag

iv) 4 - Text input media

v) 5 - File count

vi) 6 - Non RDT field

vii) 7 - Space Character - Col. 7

viii) 8 - First character precedence check

ix) 9 - Second character precedence check

x) 10 - Space character - Col. 10

xi) 11 - Security Trigraph

xii) 12 - Space Character - Col. 14

xiii) 13 - Originating Station Routing Indicator

xiv) 14 - Station Serial Number

xv) 15 - Space Character - Col. 26

xvi) 16 - Julian Date Time Group

xvii) 17 - Space Character - Col. 34

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xviii) 18 - Estimated Block Count

xix) 19 - Hyphen - Col. 40

xx) 20 - Classification indicator

xxi) 21 - Dual Hyphen - Cols. 45 & 46

xxii) 22 - RI Terminating Period missing

xxiii) 23 - RI not all Alphas

xxiv) 24 - RI field separator

(b) Format Line 2

i) 1 - FMT line 2 missing

ii) 2 - Classification field mismatch

iii) 3 - ZNR/ZNY mismatch with classification

iv) 4 - Space character - Col. 4

(c) Format Line 3: 1: Format Line 3 missing

(d) Format Line 9: 1: Format Line 9 missing

(e) Format Line 1Ø

i) 1 - Format line 1Ø missing

ii) 2 - Mismatch of format lines 3 & 1Ø

(f) Format Line 11

i) 1 - EOT

ii) 2 - Block Count in columns 6-10 does not match accumulated block count

c. Queuing II: Demonstrate that valid message enters the transmission queue in precedence order. To accomplish this, two or more DATA messages of different precedence will be released for transmission in reverse precedence order. Upon

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completion of transmission, the logs will be examined to verify that the message TSNs increase with decreasing precedence.

d. Logging and Courtesy copy Printing

1. Demonstrate that input and output entries are created, include all required contents, and are in the proper format. This is to be accomplished by examining the logs.

2. Demonstrate that a courtesy copy is printed after validation is completed.

(a) DATA other than binary: header and text printed

(b) Binary DATA: Header only printed

e. Transmission II:

(1) Test normal DATA message transmission by excuting the TMM command. Transmission of the message is verified by observing the output log. Repeat the test using a message containing validation errors and the TMM,NV command.

(2) With messages in the transmission queue, repeat the above test (TMM command), then issue the OFF command. Repeat the procedure using the STD command, then again using the ORD command.

(a) In the case of the OFF command, the transmission should be terminated and requeued for later retransmission. After issuing the OFF command, the RDT must sign on again (SON) then enable the DATA circuit (CID command) for continuation of the test.

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Verify that the message was requeued for transmission by observing the output log after executing the above procedure.

(b) With the STD command, the DATA transmission in progress should be aborted with further DATA transmissions inhibited until issuance of the CID command. This will be verified by examining the RDT Logs.

(c) Issuance of the ORD command should result in termination of the transmission in progress with a BUST ender and the message aborted, with further DATA transmission inhibited until issuance of the CID command. This will be verified by examining the RDT Logs. The ORD command results in requeuing of the terminated transmission, so that, after reenabling the DATA circuit, the message should be retransmitted. Verify this by examining the logs.

(3) Verify that the EXCESS RECORDS-ORIGINATING DATA Alarm functions by attempting to transmit a DATA message consisting of over 21,000 text blocks.

(4) Demonstrate that transmission is according to precedence order. To accomplish this, disable the DATA circuit and release a series of valid DATA messages for transmission, allowing time for all messages to clear validation and queue for transmission. The circuit will then be enabled (CID command), and a pair of FLASH DATA messages released

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sequentially. Examination of the logs should show that the FLASH messages completed transmission in order of release (FIFO for messages of equal precedence) and ahead of all other messages which were queued for transmission.

f. Demonstrate Retrieval and Retransmission Capability. This test will be conducted by exercising the GET,DM,tsn command to retrieve DATA messages, and the RTD,tsn command to retrieve and queue the message for retransmission. Verify that GET is a valid command from all consoles, and that RTD is an SCC-only command by issuing the commands from both types of consoles. The RTD command should be rejected if entered from a console other than the SCC. Test the BOR,MSG command by retrieving a message then applying the command. The message should be aborted. The RDT message logs will be examined to verify the following:

(1) There is no new TSN assignment for a retransmitted DATA message.

(2) The logs are properly annotated, indicating a message retransmission.

(3) A message which is retrieved and aborted is neither transmitted nor logged.

g. Demonstrate capability to purge a DATA message. This will be accomplished using the PUR,DM,tsn command. The RDT should respond with the TSNxxx - MSG PURGED alarm. Apply the PUR

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command to a message which is queued for transmission, then examine the message logs after the queue has been cleared to verify that the message was not transmitted.

3. Demonstrate capability to output a DATA message to peripherals.

   a. Test the PNT,n,DM,tsn command from all consoles

   b. Test the PCH,CDP,DM,tsn command from all consoles

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5. TERMINATING MESSAGE TRAFFIC PROCESSING

This series of tests is designed to test the capability of RDT to receive and properly process messages in the absence of outgoing messages.

A. Receive TTY Messages

1. Verify ability to control the TTY circuit using the OFF, OUT, ORQ and CIN commands. These tests will be initialized by having the RDT signed on, the TTY circuit enabled, and TTY messages in transmission.

   a. Execute the OFF command. This should result in RDT termination of the incoming transmission and a log entry. Verify by examining the message logs.

   b. Execute the OUT command. This should have no effect on TTY message traffic being received. Verify by having the HDS emulator transmit a TTY message while the RDT is in the OUT status.

   c. Execute the ORQ command. This action should have no effect on received TTY message traffic. Verify by having the HDS emulator transmit a TTY message while the RDT is in the ORQ status.

2. Verify the TTY CIRCUIT DOWN alarm. This will be accomplished by having the HDS emulator initiate a TTY message, followed by deactivation of the MODEM eliminator. Two minutes later, the alarm should appear at RDT.

3. Verify correct allocation of disc files (if allocated sectors full, overwrite oldest entry). This is accomplished by retrieving

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messages in reverse chronological sequence. Older messages should be overwritten before newer ones.

4. Verify allocation of time of receipt (TOR) by examination of the message logs.

5. Verify message validation

   a. Verify message not spilled

   b. Message containing any or all of the Format Line errors listed in 4.B.2.b will be spilled to SCC console

      1. Verify that Format lines can be edited and the message requeued properly under operator command, without generating another input log entry or courtesy copy, using the REL command.

      2. Verify that SCC operater can override validation by executing the REL,NV command.

6. Verify message logging functions by examining input and output logs

   a. If log entry fills input or output log page, page is automatically printed.

   b. Log entries for each message received.

   c. Each incoming message has a TSN assigned

7. Verify printing of courtesy copy.

8. Verify distribution and print format of incomming TTY messages. This will be accomplished by observing the automatic printing of the number of copies of each message specified in Format line 12E.

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Observe whether paging requirements are met, and verify proper format. Verify dissemination line printing at the end of each message.

B. Receive Data Messages

1. Verify ability to control the DATA circuit using the OFF, STD, ORD, and CID commands. These tests will be initialized by having the RDT signed on, the DATA circuit enabled, and DATA messages in transmission.

   a. Execute the OFF Command. This should result in RDT termination of the transmission and a log entry. Verify by examining the message logs.

   b. Execute the STD Command. This should have no effect on the receipt of DATA messages by the RDT. Verify by having the HDS emulator send a DATA message while the RDT is in STD status.

   c. Execute the ORD command. This action should have no effect on the receipt of DATA messages by the RDT. Verify by having the HDS emulator transmit a DATA message while the RDT is in ORD status.

2. Verify formation of correct length blocks

3. Verify correct allocation of disc files

   a. If allocated sector full from previously written messages, overwrite oldest entry. This is accomplished by retrieving messages in reverse chronological order.

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b. If DATA zone 90% full output alarm. This will be accomplished by sending a 20,000 block DATA message to the RDT. This should result in output of the DATA ZONE 90% FULL alarm.

4. Verify allocation of TOR by examination of the message logs.

5. Verify message validation

   a. Valid message not spilled

   b. Message containing any or all of the Format Line errors listed in 4.C.2.b will be spilled to SCC console.

      1. Verify that Format Lines can be edited and the message requeued properly under operator command (REL) without generating an input log entry or courtesy copy.

      2. Verify that the SCC operator can override validation using the REL,NV command.

6. Verify message logging by examining the input and output logs.

   a. If log entry fills input or output log page, page is automatically printed

   b. Log entries for each message received

   c. Each incoming message has a TSN assigned

7. Verify printing of courtesy copy.

   a. If binary data, only header is printed

8. Verify distribution of message

   a. Verify that DATA message is output to Printer (132 column size), Mag Tape, Cards in any allowable combination thereof depending on message header contents.

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b. Verify NUT Command from the SCC and operator consoles. This will be accomplished by exercising each of the combinations of console, input device and output device listed in Table II. The Table also indicates the restrictions regarding block size and DATA coding which must be complied with for NUT to be valid. Specification of an incorrect block size will result in an error message (distinguished from an alarm by the fact that it does not result in a log entry). This function will be tested by deliberately specifying an incorrect block size.

Selection Aid

COIN	DIE	Console	Input Device	Code/ Block Size	Output Device
H	1	SCC	MT	No restrictions	MT
H	2	SCC	MT	EBCDIC/80	CR
H	3	SCC	MT	EBCDIC/≤132	LP
H	4	SCC	CR	ASCII/80	MT
H	5	SCC	CR	ASCII/80	CR
H	6	SCC	CR	ASCII/80	LP
T	1	Oper	MT	No restriction	MT
T	2	Oper	MT	EBCDIC/80	CR
T	3	Oper	MT	EBCDIC/≤132	LP
T	4	Oper	CR	ASCII/80	MT
T	5	Oper	CR	ASCII/80	CR
T	6	Oper	CR	ASCII/80	LP

TABLE II

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The automatic translation of ASCII to EBCDIC and vice versa will be tested as follows:

(1) With the Mag Tape unit as the input device and either the Card Reader or the Line Printer as the output device, simply read the hard copy output.

(2) With the Card Reader as the input device and the Magnetic Tape as the output device, it will be necessary to utilize NUT twice, going from cards to the line printer via magnetic tape. The translation is verified accomplished if the line printer output is readable.

Table II includes a selection aid column to systematize the random selection of a limited sample of combinations for testing NUT. Refer to 4.C.1.

c. Verify Priority ordering of output

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6. FULL DUPLEX OPERATION

This series of tests is designed to verify the capability of RDT to operate satisfactorily in a full duplex environment.

A. Queuing Tests. The purpose of these tests are to verify the proper queuing of messages (TTY and DATA) being originated by the RDT and to verify the functioning of associated alarms.

1. Alarms Verification. For this test, the RDT will be in an up status but not signed on. In addition, the line printers will be downed for the test. A temporary software change will be made using RTE DEBUG software to in effect reduce the size of the distribution queue from 390 words to 20 words. Under these conditions, a TTY message will be generated and released for transmission (TMM command) then repetitively retrieved and retransmitted using the RTT command. Verify that the QUEUE 80% FULL (NAME OF QUEUE) alarm appears, and that after a sufficient number of retransmission attempts (when the queue overflows) the WARM START---REBOOT SYSTEM alarm appears. After completion of this test it will be necessary to execute the warm start procedures and restore the software before proceeding.

2. Transmission Queuing. The initial state of the RDT will be up but not signed on for this test. The test will be conducted by releasing several DATA and TTY messages for transmission in reverse priority order. The message set will consist of at least three DATA messages with two of the same precedence and at least three TTY messages with two of the same precedence. Once all messages have been validated (and therefore queued for transmission), RDT

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will sign on, issue CIN and CID, resulting in the transmission of the messages. Upon completion of transmission of the message set, the output log will be examined to verify that the TTY messages were transmitted first, in precedence order, FIFO for messages of equal precedence, followed by the DATA messages, in precedence order, FIFO for messages of equal precedence.

B. Transmission Precedence and Circuit Control

1. Verify transmission in precedence order in a dynamic environment.

   a. With a DATA message in transmission from the RDT, release a TTY message for transmission from RDT. Subsequent examination of the message logs should indicate that transmission of the TTY message preceded completion of transmission of the DATA message.

2. Verify that the DATA circuit can be controlled independently of the TTY circuit. For each of the following tests, both the RDT and HDS emulator will sequentially release DATA and TTY messages for transmission in the order DATA, TTY, DATA,..... . The indicated commands will be issued while a DATA message is being transmitted (ideally, while DATA messages are in transmission in both directions).

   a. Verify the STD command. Issuance of this command should result in the immediate aborting of the DATA message being transmitted with complete inhibiting of all further DATA transmissions, but with no effect on receiving DATA or on the TTY circuit. Verify by remaining in this state long enough for the HDS emulator to transmit at least one TTY

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message and at least one DATA message, with the RDT likewise continuing its attempts at transmission. Examine the RDT logs to verify that no DATA messages were transmitted while under the STD condition, that the DATA message being transmitted at the time STD was issued was aborted, that DATA messages were received, and that TTY messages were transmitted or received. Restore the circuit using the CID command.

b. Verify the ORD command. Upon issuance of this command, the sequence of events and procedures described in 6.B.2.a should result with the exception that the DATA message being transmitted at the time of ORD issuance was requeued for transmission. This is to be verified by issuing the CID command (restoring the DATA circuit) and observing that the message is automatically retransmitted by examining the message logs.

3. Verify that the TTY circuit can be controlled independently of the DATA circuit. For each of the following tests, both the RDT and the HDS emulator will sequentially release TTY and DATA messages for transmission in alternating order. If possible, the indicated commands will be issued while TTY messages are being transmitted from and received by the RDT.

a. Verify the OUT command. Issuance of this command should result in completion of the TTY message in transmission, followed by inhibition of the TTY circuit, with no effect on DATA transmissions. Verify by remaining in this state long enough for the HDS emulator and the RDT to each transmit

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at least one each DATA and TTY message. Examine the RDT message logs to verify that no TTY messages were transmitted while the OUT command was in effect but that TTY messages were received, and the command had no effect on the DATA circuit. At the end of the test, restore the circuit using the CIN command.

b. Verify the ORQ command. Upon issuance of this command, the sequence of events and procedures described in 6.B.3.a should result with the exception that the TTY message in transmission from RDT at the time of ORQ issuance was requeued. Verify by examining the RDT message logs.

C. Line Printer Control. The purpose of this test is to verify the IHD, IHT, END and ENT commands. For this test, the RDT must be configured with two line printers. For the sake of definitiness, it is specified that LP1 be designated the TTY printer. During the course of the test, the HDS emulator will sequentially send TTY and DATA messages in alternating order. When the test begins, LP1 will be downed locally and the following sequence followed:

1. The IHD command will be issued. This should result in inhibiting of LP2. Once this occurs, the operator shall change the forms in LP2.
2. Once LP2 is loaded with TTY paper, the ENT command will be issued. This should result in the printing of TTY messages and logs (if scheduled) on LP2.
3. After sufficient time has passed to verify that TTY and logs but no DATA are being output to LP2, completion of repair to LP1 will

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be simulated by uping it locally. The IHT command will then be issued, resulting in cessation of all printing activity on LP2.

4. With LP2 inactive, the operator shall change paper for that printer from TTY to DATA. When this is done, the END command will be issued, resulting in printing of DATA on LP2. LP1 will be then restored by issuing the UP,LP1 command and then the ENT command. At this point, LP1 should print accumulated TTY messages and logs, with LP2 printing DATA.

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APPENDIX I: RDT COMMANDS MAP

I. SCC CONSOLE ONLY COMMANDS

COMMAND	PRINCIPAL TEST OF COMMAND
Communications Control	
SON	3.A
OFF	4.B.2.e, 4.C.2.e
CIN	4.A
OUT	4.B.2.e
ORQ	4.B.2.e
CID	4.C.2
ORD	4.C.2.e
STD	4.C.2.e
Message Retransmission	
RTT,tsn	4.B.2.g
RTT,ti	4.B.2.g
RTD,tsn	4.C.2.f
Message Printing Control	
IHT	6.C.3
IHD	6.C.1
TTY,$lp_{1 \text{ or } 2}$	2.B
ENT	6.C.2
END	6.C.4
System Status & Peripheral Control	
UP,dev	2.C.1
DWN,dev	2.D
STA	2.E.1
General	
PUR,TM,tsn	4.B.2.f
PUR,DM,tsn	4.C.2.g
CMT,$x_{1...},x_{65}$	4.B.4.a
TM,$_{yyyy,ddd,hh,mm}$	2.B,2.F
TIM	2.F
COP	2.C.2
Service Message Transmission	
CCK	4.A.3
QRT	4.A.1
QRV	4.A.1
ZES,ti,precedence	4.A.1
ZFX,ti	4.A.1
CSR	4.A.1

II. COMMANDS ISSUABLE FROM ALL CONSOLES

COMMAND	PRINCIPAL TEST OF COMMAND
Message Generation	
ITM,hdr-dev,txt-dev	4.B.1
IDL,hdr-dev,text-dev,blksiz	4.C.1
Message CRT Retrieval	
SVC	4.A.2
GET,TM,tsn	4.B.2.g
GET,TM,ti	4.B.2.g
GET,DM,tsn	4.C.2.f
Message Console Control	
REL	5.A.5
REL,n	5.A.5
REL,NV	5.A.5
REL,n,NV	5.A.5
TMM	4.B.2.e
TMM,NV	4.B.2.e (developmental command - not included in delivered system)
BOR,MSG	4.C.2.e
BOR,dev	4.B.3.b
N	4.B.1
Peripheral Output	
PNT,n,TM,tsn	4.B.3.a
PNT,n,TM,ti	4.B.3.a
PNT,n,DM,tsn	4.C.3.a
PNT,n,RP	2.E.1
PNT,n,ML	4.B.2.d
PNT,n,ML,tsn	4.B.2.d
PNT,n,ML,ti	4.B.2.d
PNT,n,ML,jdtg	4.B.2.d
PNT,n,ML,jdtg,jdtg	4.B.2.d
PTN,n,SL	4.B.4.b
PNT,n,SL,jdtg	4.B.4.b
PNT,n,SL,jdtg,jdtg	4.B.4.b
PCH,TTY,TM,tsn	4.B.3.a
PCH,TTY,TM,ti	4.B.3.a
PCH,CDP,DM,tsn	4.C.3.b
NUT,in-dev,out-dev,blksiz	5.B.8
Editing	
U,ln	4.A.2
D,ln	4.A.2
S	4.A.2
I	4.A.2
R	4.A.2
C,abc.../xyz...	4.A.2
L	4.A.2
X	4.A.2

APPENDIX II: RDT ALARMS MAP

ALARM	PRINCIPAL TEST OF ALARM
(Communications Problems)	
Hung Block - TSNxxx	4.B.2.e
TTY Circuit Down	5.A.2
Unable Sign On	3.A.2
No ENQ Response	3.B
No Comp-TTY CCK	4.A.3
Signed On	3.A.1
(Message Processing Problems)	
TSNxxx - Block Size Error	4.d.1
- File Count Error	4.d.1
- Record Count Error	4.d.1
- End of Msg	Reserved for future use - not tested
- Line Recognition Error	
- Msg Purged	4.B.2.f
(Operator Command Errors)	
RDT DEVICE DOWN - (dev)	4.B.3.d
SCC Log**Not in File (JDTG)	4.B.4.b
Msg Log**Not in File (TI,TSN, or JDTG)	4.B.2.d
(Resource Condition Warning)	
Disc DS (0 or 1) Inoperable	2.E.2.c
(Device) Busy	4.B.3.c
DATA Zone 90% Full	5.B.3.b
TSNxxx - Excess Records	Requires link with HDS - not tested
Unable Complete Codexx	
Warm Start---Reboot System	6.A.1
Queue 80% Full (Name of Queue)	6.A.1
Excess Records - Originating DATA	4.C.2.e
(Disc Copy Functions)	
Disc Copy in Progress	2.E.2.a
Disc Copy Verified Completed	2.E.2.a
Disc Copy Verified Aborted	2.E.2.b
Verify Error:LU(#)TRACK(#)SECTOR(#)	Cannot simulate disc error - not tested

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Temp

XMSN — > Sec re straglr - image change or seq numbering
(SFA)
Paint

sec flgs
alarms -
verify exec of critical modules
Password for console

1. How many Data I/O ports ?
2. Teletype ?
3. outside users
4. What CATS - more discussed - Types?
5. TTY HDR from cards.
6. Clear core/DISK ? Verify ! howdone
7. any OTC services who
8. Val straglr in Receive module.
9. output checks. -
10. Guard against o/c programming,
When ready for T.

11. TSN on ~~disc~~ seq? Front + rear - seq nos also
on seqs.
12 Why TST dropped.